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Type revision of neotropical *Aradus* described by C. STAL

(Heteroptera, Aradidae)

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Abstract

10 species of *Aradus* have been described to date from the Neotropical Region, C. STAL was the author of four species of which three are still valid (*falleni*, *compressicornis*, *gracilicornis*) and one is a synonym (*pallidicornis* = *falleni*). As no holotypes have been designated by STAL, his type material has been revised and holotypes were fixed in accordance with Art. 73a (ii) Int. Code of Zool. Nomenclature. Of these holotypes, head, antennae and pronotum are figured and additional data and comparative notes as well as photos of the partly unknown male pygophore are given.

Introduction

From the Neotropical Region (South- and Mesoamerica, incl. Caribbean Islands and Mexico), 10 species of the primarily holarctic genus *Aradus* were described to date (KORMILEV & FROESCHNER 1987: 11, 35 ff).

Carolus STAL, one of the great Scandinavian hemipterists of the last century, described 4 species of *Aradus* (*falleni*, *pallidicornis*, *compressicornis*, *gracilicornis*) of which two (*pallidicornis*, *compressicornis*) were synonymized later (BERGROTH 1886) but one of them (*compressicornis*) has been revalidated again (KORMILEV 1976). This present taxonomic status is here confirmed.

The specimens on which STAL's descriptions were based are preserved in the collection of the Naturhistoriska Riksmuseet in Stockholm and have been made available by Dr. P. LINDSKOG for the present study.

As usual in the last century, no holotypes have been designated. The presently attached labels "Typus" or "Allotypus" were obviously added later. Therefore the authenticity of the type material had to be verified by checking and comparing the original descriptions with the original labelling of the specimens, before the assumption of holotypes was justified.

Methods

Sequence and data of the original labels on each pin, associated with the respective specimen are indicated in the text from top to bottom.

Due to the fact that the unique type material is pinned and already partly damaged, it has not been remounted or dissected and the presented male genitalic structures were taken from other, clearly conspecific specimens.

Measurements were taken with a micrometer eyepiece 40 units = 1 mm. The length of the head is measured from apex of clypeus to the posterior margin of v-shaped line delimiting the vertex.

Results

Aradus falleni STAL, 1860

Figs. 1, 3, 12

- 1860 *Aradus Falléni* STAL: Svenska Vet. -Akad. Handl. 2(7): 68 (orig. descr.)
1873 *Aradus (Aradus) Fallénii* (sic) STAL: Svenska Vet. -Akad. Handl. 11(2): 136 (keyed)
1886 *Aradus Falleni* BERGROTH: Wien. Entomol. Zeitg. 5(3): 97 (distr., variability, synonymies)
1896 *Aradus falleni* LETHIERRY & SEVERIN: Cat. Gén. Hém. 3: 34 (listed)
1898 *Aradus falléni* CHAMPION: Biol. Centr. Am., Rhynch. 2: 66, tab. V fig. 1 (habitus of female)
1921 *Aradus falleni* PARSHLEY: Trans. Am. Ent. Soc. 47: 28, 92, pl. VI fig. 53 (redescr. ♂ ♀, distr., 4 figs.)
1943 *Aradus falleni* WYGODZINSKY: Rev. de Ent. 14(3): 507, fig. 2 (fig. ♀ head, pron. venter)
1944 *Aradus falleni* WYGODZINSKY: Rev. de Ent. 15(3): 330, fig. 2 (fig. ♂ term. segm., pygoph., distr.)
1959 *Aradus falleni* USINGER & MATSUDA: Classific. Aradidae: 89 (listed)
1977 *Aradus falléni* MATSUDA: The Insects and Arachnids of Canada 3: 62, pl. 12, fig. 12 (habitus photos ♂ ♀, 3 figs.)
1987 *Aradus falleni* KORMILEV & FROESCHNER: Entomography 5: 45 (listed)

Material examined:

Male: "Brasil" (white label, printed) / "P. Sahlb." (white label, printed) / "Falleni STAL" (STAL's handwriting) / "Typus" (red label, added later).

Female: "Texas" (white label, printed) / "Belfrage" (white label, printed) / "Allotypus" (red label, later added)

Additional specimens investigated: USA: ♂, Washington D. C. (coll. Mus. Stockh.); ♂ ♀, California; ♂ ♀, Georgia; ♂ ♀ Louisiana; ♀, Virginia; ♀, Florida; ♂, Texas; ♂, Arizona; ♂, Oregon. Mexico: ♂, Guerrero (Acahuixotla); ♂ ♀, Chiapas (Bonampak, Palenque); ♂, San Luis Potosi (Ciudad de Valles). Brazil: ♂ ♀, Env. Rio d. Janeiro (Petropolis). Belize: ♂, Cayo Distr. (all coll. EH).

STAL has based his description on a male specimen, therefore it is evident that the abovementioned male is the holotype by monotypy (Art. 73a(ii) Int. Code Zool. Nom.). It has been labelled accordingly "Holotype *Aradus falleni*, STAL, 1860, det. E. Heiss 1992".

The female labelled "Allotypus" is not mentioned by STAL 1860 nor 1873 and does not belong to the original material. Therefore it cannot be regarded as "Allotypus".

BERGROTH 1886: 97 opposed to the opinion of STAL, 1873: 136 that *Aradus leucotomus* COSTA is synonymous with *A. flavicornis* DALMAN and stated that Costa's species is a synonym of *A. falleni*. Both were wrong. A note concerning its true identity is in press.

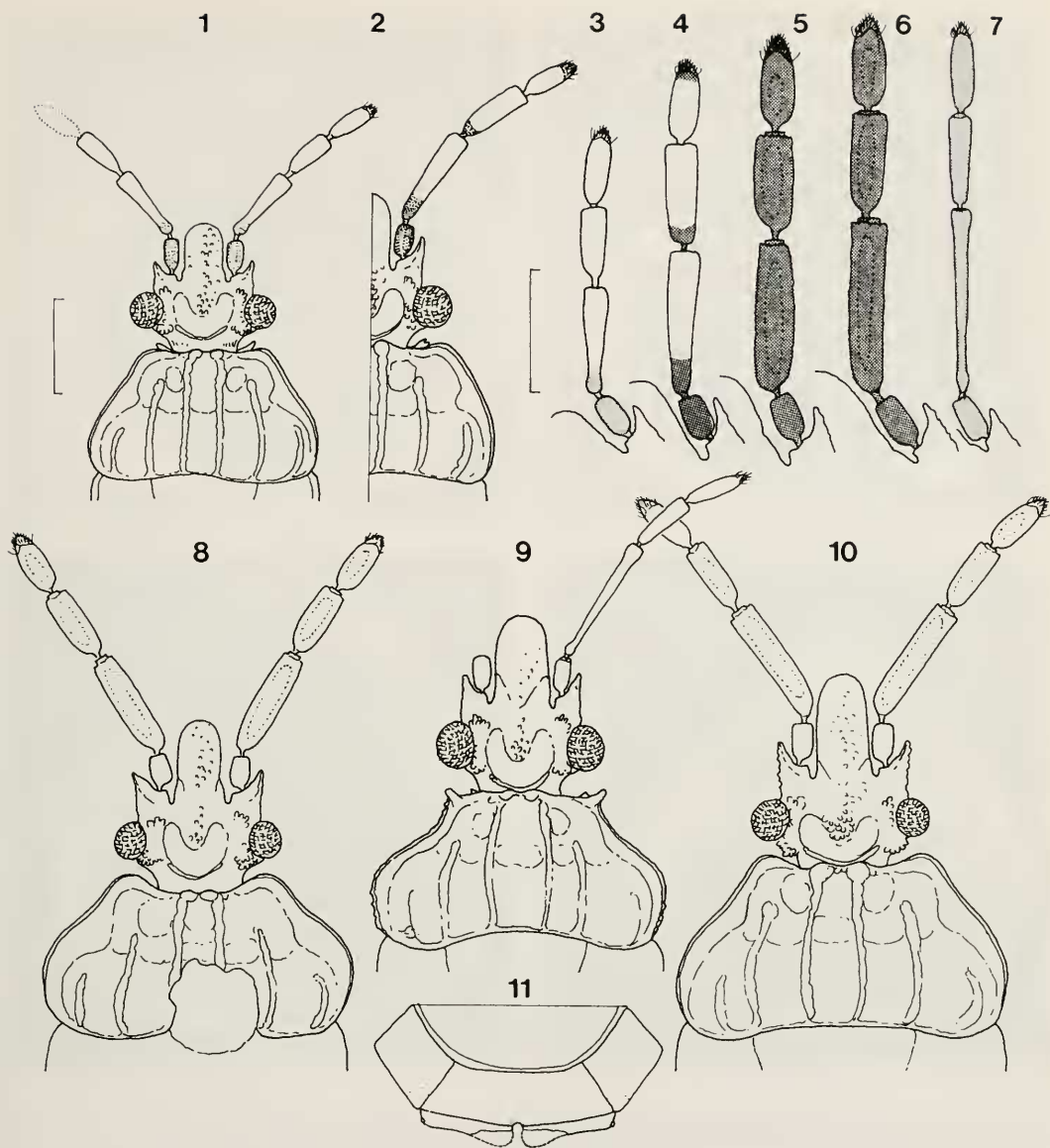
Additional notes: The male holotype lacks the left antennal segment IV and the abdomen is turned down by the insertion of the pin through the scutellum, therefore the length cannot be given.

Measurements: Head length/width across eyes 27/29, relative length of antennal segments I to IV = 7/16.5/11.5/11, ratio length of antenna/width of head 1.58, pronotum length/width 26/47.5, rostrum reaching suture of pro- and mesosternum.

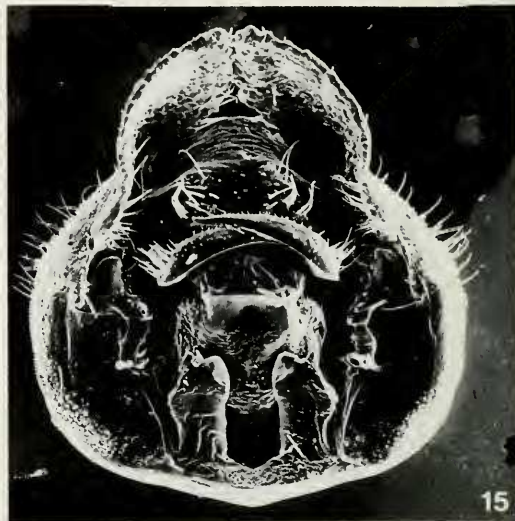
Genitalic structures (Fig. 12.): Male genital segment (VIII) shows expanded posterior lobes and a rhomboidal caudoventral opening. Tergite IX formed by 2(1+1) elongate, narrow, apically enlarged lobes. From the apex an acute projection is pointing ventrally. Parandria long with widely rounded apex, projecting over pygophore, inner surface with dense long setae. Parameres slender. Subgenital plate with long setae medially.

Discussion: *A. falleni* is known from Brazil to USA and Southwestern Canada but seems to be rare in Latin America and more common and widely distributed in the Nearctics. It is the only species occurring in USA with a caudoventral opening of the pygophore as it is typical for most neotropical *Aradus* (not in *mexicanus* US., *testaceus* KORM. and *granuliger* KORM. all from Mexico, but the latter two species do not belong to the "falleni"-group) and therefore easily recognized.

It has been confused however with *A. fronterana* DRAKE which is very similar in appearance but has the antennal segment II longer and clavate, not constricted before base, and lacks the long pilosity of the parandria.



Figs. 1-11. Neotropical *Aradus*. 1, 2, 8, 9, 10. head and pronotum; 3-7. right antenna, 11. tergites VII+VIII of female. 1, 3. *Aradus falleni*, holotype ♂; 2, 4. *A. fronterana* ♂ (Mexico); 5, 8. *A. compressicornis*, holotype ♀; 6, 10. *A. angustellus* ♀ (Chile); 7, 9, 11. *A. gracilicornis*, holotype ♀. Scale 0.5 mm.



Figs. 12-15. Male genital capsules of Neotropical *Aradus*, dorsal view. 12. *Aradus falleni* (Mexico); 13. *A. gracilicornis* (Mexico); 14. *A. compressicornis* (Venezuela); 15. *A. angustellus* (Chile). Scale 0.1 mm.

Aradus pallidicornis STAL, 1873

1873 *Aradus (Aradus) pallidicornis* STAL: Svenska Vet. - Akad. Handl. 11(2): 136 (orig. descr.)

1886 *Aradus pallidicornis* BERGROTH: Wien. Entomol. Zeitg. 5(3): 97 (synonymy with *falleni*)

All subsequent authors followed BERGROTH's decision.

Material examined: Female: "Cuba" (white label, printed) / "STAL" (small white label, printed) / "*pallidicornis* STAL" (STAL's handwriting) / "Typus" (red label, later added).

STAL described *pallidicornis* after a female specimen from Cuba which corresponds with the only existing specimen. It is designated as holotype by monotypy.

Additional notes: The holotype lacks the right antennal segment IV.

According to STAL, this species is "maxime affinis et simillimus" to *falleni* but differs by antennal segment IV shorter than III and longer rostrum. The first statement could not be verified as both antennal segments are of the same length, the rostrum is longer in females than in males as other specimens show. The specimen has also unicolourous yellowish antennae, which was the name-giving character. However the colouring of the antenna is variable as already stated by BERGROTH (1886) and PARSHLEY (1921); usually light brown with darker segments I and base of II it varies from dull white to more extended darker colouration.

The synonymy established by BERGROTH can be confirmed.

Measurements: Female: Length 4.65 mm, head length/width 32/33.5, relative length of antennal segments I to IV = 7/20/12/12, ratio antennae/width of head 1.52; pronotum length/width 33/63; scutellum 42/30; width across tergite III 78; corium reaching $\frac{3}{4}$ of dorsal laterotergite IV; rostrum reaches $\frac{1}{4}$ of mesosternum.

Aradus compressicornis STAL, 1873

Figs. 5, 8, 14

- 1873 *Aradus (Aradus) compressicornis* STAL: Svenska Vet. - Akad. Handl. 11(2): 136 (orig. descr.)
1879 *Aradus compressicornis* BERG: Hemipt. Arg.: 138 (record for Chile)
1886 *Aradus compressicornis* BERGROTH: Wien. Entomol. Zeitg. 5(3): 97 (synonymy with *angustellus* BLANCHARD, 1852)

Subsequent authors followed BERGROTH's decision.

- 1951 *Aradus angustellus* KORMILEV: Comun. Inst. Nac. Invest. Cienc. Nat. "Bernardino Rivadavia", Cienc. Zool. 2: 85 (specimen of Berg, 1879 = *angustellus*)
1976 *Aradus compressicornis* KORMILEV: Rev. Brasil. Biol. 36: 735 (restored species status, record from Peru)
1987 *Aradus compressicornis* KORMILEV & FROESCHNER: Entomography 5: 41 (listed)

Material examined:

Female: "Bogota" (white label, printed) / "Lindig" (white label, printed) / "compressicornis STAL" (STAL's handwriting) / "Typus" (red label, later added).

Additional specimen: Male, Venezuela, Pmo. de Guaramacal, 3000 m, Bocanó, Env. Trujillo, Bordon 7.VIII.1981 (coll. EH).

As STAL's description was evidently based on the single female, this is fixed as holotype by monotypy and the respective label added.

Additional notes: The female holotype has complete appendages but shows a former pinhole on the pronotum; the actual pin passes through the right corium.

Measurements:

Holotype female: Length 5.1 mm; head length/width 35/35, relative length of antennal segments I to IV = 7/25/16/14, ratio antennae/width of head 1.77; pronotum length/width 29/65; scutellum 40/28; width across tergite IV 75; corium reaching $\frac{1}{4}$ of dorsal laterotergite V.

Male (Venezuela): Length 4.3 mm; head length/width 29/31.5, relative length of antennal segments I to IV = 7/21/15/13.5, ratio antennae/width of head 1.79; pronotum length/width 26/55; scutellum 37/23; width across corium 57.5, the latter reaching $\frac{1}{2}$ of dltg VI.

Distribution: All three specimens known to date are from high altitude localities (Colombia, Bogota; Peru, Cuzco-Urubamba at 2863 m; Venezuela, Pmo. Guaramacal at 3000 m). It seems to be distributed in north-western South America where *angustellus* has not been recorded.

Discussion: Due to the single specimen cited, the differences mentioned by KORMILEV (1976) seemed arbitrary. Now the male specimen available allowed also a study of the genitalic structures and the following differences can be confirmed as well as the species status.

<i>angustellus</i> figs. 6, 10, 15	<i>compressicornis</i> figs. 5, 8, 14
– depressed ant. segm. II+III slender, sides parallel	II spindle-shaped, sides slightly convex, III wider
– anterolateral angles of pronotum narrow, angularly rounded	wider and broadly rounded
– pronotum strongly constricted anteriorly	pronotum wider and less constricted anteriorly
– male genitalic structures as fig. 15	parandria, parameres, tergite IX, pilosity of subgenital plate different, see fig. 14

Both species might have been confused and collection material should be checked in this respect.

Aradus gracilicornis STAL, 1873

Figs. 7, 9, 11

- 1873 *Aradus (Aradus) gracilicornis* STAL: Svenska Vet.-Akad. Handl. 11(2): 136 (orig. descr.)
 1887 *Aradus gracilicornis* BERGROTH: Rev. Ent. Caen 6: 246 (redescr. of STAL's type specimen)
 1896 *Aradus gracilicornis* LETHIERRY & SEVERIN: Cat. Gén. Hém. 3: 35 (listed)
 1921 *Aradus gracilicornis* PARSHLEY: Trans. Am. Ent. Soc. 47: 28, 87, pl. V fig. 49 (redescr., 4 figs. ♂ ♀, keyed)
 1959 *Aradus gracilicornis* USINGER & MATSUDA: Classif. Arad.: 90 (listed)
 1987 *Aradus gracilicornis* KORMILEV & FROESCHNER: Entomography 5: 46 (listed)

Material examined:

Female: "Cuba" (white label, printed) / "STAL" (small white label, printed) / "*gracilicornis* STAL" (STAL's handwriting) / "Typus" (red label, added later).

Additional specimens investigated: Mexico: ♂, Morelos (Villa de Ayala), ♂ ♀ Chiapas (Bonampak, Agua Azul); USA: ♂, Florida, ♂, Alabama, ♀, Texas (coll EH).

According to STAL's description, only the female from Cuba was available which is fixed as holotype by monotypy and labelled accordingly.

Additional notes: The holotype lacks the left antennal segments II to IV, the right antenna is broken off from segment II and detached but fixed close to the head by a thread of glue. The paratergites VIII are partly broken off. Rostrum is missing, also left fore and middle legs, right hind leg, and tibia and tarsus of right fore leg.

This species is distributed from Mexico throughout the southern states of USA. It has been described and figured in detail by PARSHLEY (1921). The male genitalic structures of a conspecific specimen are figured here for the first time (fig. 13).

Measurements: Holotype female: Length 5.05 mm; head length/width 36/35, relative length of antennal segments I to IV = 7/27/13.5/13.5, ratio antennae/width of head 1.74; pronotum length/width 60/30; scutellum 38/30; abdomen across tergite IV 80; corium reaching $\frac{3}{4}$ dltg IV.

Discussion: *A. gracilicornis* is recognized by a set of characters: small size, unicolourous thin antennae, pronotum strongly constricted anteriorly with dentate antero-lateral angles. Further in male by the shape of tergite IX and the broad parameres, the thin, pointed parandria and the shape of tergite IX; in female by the very narrow paratergites VIII (fig. 11).

Acknowledgments

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